

# Evolution Process and Atmosphere in Organic Agriculture - A Case Study

**C.Tholkappian**

Assistant Professor

Department of Economics

Periyar University College of Arts and Science

(PRUCAS), Mettur Dam, Tamil Nadu, India

## ABSTRACT

*The farming system and organic farming have been examined and the under organic farming has been assessed with respect to important sustainability indicators such as conservation of soil, water, power and farmers economic well-being and livelihood security. In many cases majority of the farmers reported that transition from modern agriculture to ecological agriculture was due to the possibility of producing healthy food, environmental protection and soil fertility management. Organic Farming, one means all approaches based on local technology development that supplement existing know-how among farmers regarding local environmental factors with scientific insights. Here, the application of local resources and traditional knowledge is given special consideration A detailed analysis of one perennial and two seasonal crops (maize and paddy) and five annual crops (sugarcane, turmeric, banana and tapioca. The study is based on data for 2009-10 collected from 30 organic farming sample households from the Erode district of Tamil Nadu. The organic farming is labour intensive, but its cost of cultivation is lower due to saving on chemical fertilizers, irrigation, seeds and agrochemicals. The yield on organic farmer has been reported lower but it is more than compensated by the price premium received and yield and profit stability observed on the organic farming. In addition, the organic farming has been found superior in terms of economic well being and livelihood security of the farmer.*

## I. INTRODUCTION

Farm system refers to a particular arrangement of farming enterprise e.g cropping, livestock – keeping, processing farm products that are managed in response to the physical, biological and social economics environment and in according with the farmers' goals, preferences and resources (Shaner et al 1982) Individual farms with enterprises arrangement in a similar way are said to practice that particular farming system. Farming is used here in a wide sense to include not only crops and livestock but also other natural resources available to the farm household, including resources held in common with others. Hence the given below concepts flow of goods and services of farm system.

Goods and services of farm system is a unique agroeco system a combination of physical and biological resources such as land forms, soil, water plants (wild plants, tress and crops) and animals (wild and domestic). By influencing the components of this agro eco-system and their interactions the farm household obtains output or products such as crops, wood and animals. To keep the production process going, the household needs inputs e.g. seeds energy, nutrients, water. Internal inputs are those harvested on the farm, rain water, sediments, nitrogen fixed from the air or produced on the farm e.g., animal traction, wood, manure, fodder, family labor and learning experiences. External inputs are those obtained from outside the farm e.g., information, hired labor, fossil fuel, mineral fertilizers, chemical biocides, irrigation water, tools, machinery, and services.

The output can be used as internal inputs, consumer by the farm household (reproducing farm labor) or sold,

exchange or give away. During the production process, some losses occur as a result of for example, leaching or violating of nutrients or soil erosion. The sales provide cash which can be used to buy different goods or services e.g., food clothes, education, transport, to pay taxes and or to obtain in direct exchange for output.

## II. FEATURES OF FARMING SYSTEMS

During early days of human civilization, agriculture was without external inputs and subsequently improvement in science and technology has taken agriculture as more commercial and consequently became unsustainable. Large scale external inputs were used to grow more food grains to meet the increasing population and land being inelastic resource; it was needed to increase the productivity from a given parcel of land termed as High External Input Agriculture (HEIA). Such development took place more in industrialized countries and they had trade advantages and slowly, developing countries also followed the suit although the potential has not been taped fully. However, across the world the agriculture is becoming more commercial and external input are extensively used with intensive cultivation practices. On the part of the state many supportive programs (including direct and indirect subsidies) were launched to protect agriculture especially in developed countries. Consequently modern and commercial agriculture system emerged and evaluation studies show that agriculture under this system has negative implications like uneconomical, class disparity, environmental degradation and technically not feasible and in the long run unsustainable

(Reijntjes et al, 1992). Also local knowledge system developed and practiced over generations, have replaced by laboratory made agricultural packages. Alternative to HEIA, states, NGOs across the world are attempting to develop a framework - Low External Input and Sustainable Agriculture (LEISA) - for promoting Sustainable Agriculture Development (SAD) (IFOAM, 2002) Farming systems can be classified into three types based on the inputs use.

- ❖ Traditional agriculture.
- ❖ Conventional or modern agriculture.
- ❖ Organic agriculture.

Traditional agriculture means subsistence oriented farming system using low external inputs. Conventional or modern agriculture aims at production maximization through the use of external inputs such as chemical fertilizers, pesticides, herbicides and labor saving but energy extensive farm machinery. Ecological agricultural system is based on ecological principles and applying ecological practices to maintain soil fertility, to manage crop and animal health, and to keep soil and water in a good condition without the use of chemical inputs for e.g., synthetic fertilizers, pesticides and herbicides. Ecological agriculture which is used synonymously to organic agriculture produces organic products. These features of the farming systems are summarized in Table 1.1. Conventional or modern agriculture system has limited advantages on issues like application of external inputs like fertilizers, pesticides and farm complexity as compared with ecological agriculture. While other aspect like sustainability is found high under ecological agriculture, it is quite low from the conventional or modern farming

system. The three systems are also referred to Natural Farming System, Inorganic (Modern) Farming System and Ecological (Organic) Farming System. Natural Farming System which is also Conventional Farming System is considered as a primitive and extensive farming system which gives low production. In order to improve productivity and increase production, new technology based Farming System was introduced which heavily depends on seed - chemical fertilizers -technology package during 1960's. This resulted in 'green revolution'. Though production increased substantially due to this new Farming System, it is not sustainable. The realization that Inorganic Farming System is not environmentally sustainable lead to the introduction and promotion of Organic Farming System. Organic or Ecological Farming System is a modified form of Natural Farming System and Inorganic Farming System. It is carried out by using internal farm and home produced low cost natural organic, biological inputs instead of chemical inputs.

There are several research studies, which have shown that Organic Farming System is designed to create eco friendly, and pollution free environment, ecological balance and microenvironment. It is also looked up on as an important and sustainable alternative in order to reduce cost of production, environmental pollution and ensuring food safety (Patra et al 2004) during the past four decades, stress was laid on intensive agriculture practices in the process of attaining higher levels of food production to keep pace with population growth. Though, India has become self sufficient in food production over the years, it has resulted in serious

environmental degradation and health hazards to mankind, animal and the biodiversity. The technologies generated over the past four decades were not in tune with the natural resources base and

environment in different parts of the world. Increasing crop yields meant intensification in the use of fertilizers and pesticides in crop production that becomes unsustainable in the long run.

### III. ENVIRONMENT CAPATIBILITY

Organic Farming, one means all approaches based on local technology development that supplement existing know-how among farmers regarding local environmental factors with scientific insights. Here, the application of local resources and traditional knowledge is given special consideration. The "Eco-farming" concept suggested by Kotschi et al (1989) and "locally adapted land use" in the sense of Kotschi/ Bread for the World/ Miserere are important contributions to the development of a concept of Organic (and Sustainable) Farming in the South. (LEISA) is another variation, albeit one that does not entirely rule out the use of pesticides and synthetic fertilizer. It is intermittent between "only" sustainable and "still" organic.

Green Revolution, which was initiated in the sixties by the international agricultural research centers, is on the outer opposite side of the diagram. Here, the emphasis was on introducing so-called high-yielding maize, wheat or rice varieties in the countries of the South, and the aim was to increase agricultural output. The yield of these varieties will only be higher in comparison to traditional land races if intensive use is simultaneously made of artificial irrigation, fertilizer and pesticides - and these costs a lot of money, which is why the Green Revolution coincided with accelerated structural readjustment in agriculture. Initially, there were enormous increases in yield in the good

farming locations, especially in Asia. But by and by, the high-yield strains had to be crossed with more suitably adapted local varieties in order to maintain yield levels in the long run. In retrospect, with its massive interventions in sensitive agro-ecological systems, the Green Revolution has caused many environmental and social problems.

Agro-genetic engineering could result in negative impacts similar to those of the first Green Revolution as well as creating new problems. Agro genetic engineering is the application of genetic engineering methods in plant breeding and the use of genetically modified plants in agriculture. Fears of cross engineering of organisms clashes with the concept of organic farming, in which the ecosystem with its diversity of interactions is to be regarded as a whole. In order to fully exploit the potentials and limit their risks, the distributors of seed and the government impose conditions on the users that no longer give any consideration to the existing traditional knowledge among the peasants.(Flow chart 1.1).

### IV. REVIEW OF LITERATURE

Dabbert and Madden (1998) in their study note that an established organic farm can be as profitable as a conventional farm under certain circumstances. However, organic farming system often require a transition period before they are fully established after a changeover from conventional farming yields may decrease and recover only

slowly during this transition period and less profitable crop rotation may be required to establish an organic system. This study reported here used a multiyear simulation model to investigate the trend in income of a 117-hectare crop livestock farm in Pennsylvania during the transition process.

Rajendran (1998) observes that all the selected farms, in the study, except one, were practicing modern farming over the years before conversion and all the farmers belong to farming community by tradition, who have gradually, ranging from 3 to 7 years, shifted some portion of their modern farming to organic farming system. According to scientist and the farmers, as reported by the author the period of transition depends upon the chemical contamination of the soil due to modern farming and the quantum of organic matter applied on the soil during transition process. Factors like low cost of various inputs, which are needed for organic farming and health consciousness influence all farmers to shift modern to organic farming. Products from local crop varieties under organic system tested well and preferred by farmers. Less than 50 percent of the selected farmers reported that an increase in yield influences them to make the transformation. Though it is a field-based study, does not cover many crops and hence lacks methodological soundness.

Siwar and Hossain (2002) in their study on 'Sustainable Agriculture: Issues, Experience and Challenges' noted that sustainable agriculture integrates three goals environmental health, economic profitability, and social and economic equity. Making the transition to sustainable agriculture is a process. For farmers, the transition to sustainable agriculture normally requires a series of

small, realistic steps. Family economics and personal goals influence how fast or low far participants can go in the transition. It is important to realize that each small decision can make a difference and contribute to advancing the entire system further on the sustainable agriculture continuum.

Kler and Walia (2004) in their study on "Organic farming – A fruitful Technology for Sustainable Agriculture" find that organic farming is more than just abandoning chemicals but it requires the elimination of persistent chemicals from soil. Therefore, there is need of conversion period from chemicals to organic farming. The period is decided on the basis of the previous use of land. Generally a three years transition period is required to convert from chemical to organic farming. The quality of agricultural produce will definitely improve with organic farming without losing quantity and it will be without residues of any inorganic chemical. Soil health will also improve. Agro-ecosystem can be maintained with organic farming system.

Reddy (2005) concludes that organic farming practices cuts down the production costs, increases the benefit cost ratio and farm income. In the present scenario of Indian agricultural market, reduction in the cost of production and risks in crop failure are relevant considerations of the farmer. During the transition period of farm conversions, capital investments are high on labor, organic matter and farm structure. Therefore, partial conversions of farms shall be either in parts of through integrated farming systems so that farmers are not put to economic constraints in their efforts.



Independent research, Siddaraju (2008) in his comprehensive study on comparative analysis of organic and conventional farming reveals that transition is a complex but slow task. It depends upon the farmer's real interest in shifting the conventional farming to organic farming in the state of Karnataka.

Rajendran and Tholkappian (2010) in their study on "Is Organic in Farming a Panacea for Food and Nutritional Security in India?" in their article observe that the modern farming system enabled to increase the food grain production substantially. Compounded with this, environmental degradation, loss in biodiversity and so on has been noticed. This has made individual thinkers to find alternative model and organic agriculture is found as sustainable and viable. In India many individuals and NGOs have been actively engaged in this domain. Nevertheless, there are some obstacles especially in marketing the organic products. Marketing for both inputs and output is found as either weak or underdeveloped. Appropriate and timely intervention will help solve the marketing problems. In this connection the field experiences in Erode, Thanjavur district and elsewhere reveal that though the spread of organic farming is found as slow, it has much advantage like environment sustainability, crop diversity, economic viability and technical feasibility. Though it is an exploratory exercise, the sample farms are highly skewed. It is observed from the above that the transition from conventional to organic depend various agro-economic features. Due to poor scientific methodological framework it is not possible to arrive at clear understanding. Therefore, the present

exercise has been taken up for a comprehensive exploration

## V. OBJECTIVES

1. To trace out perspective of the organic farming system.
2. To study the transition pattern of organic farming in the study area.

## VI. DATA AND METHODOLOGY

The present paper was conducted in Tamil Nadu. The state has been purposefully selected due to the availability of data base relating to organic farmers. Organic scientist publishes source in "Green Farm Dairy" and documents are preferred for "Dhalanmai Farmers Association" in Erode. Apart from this government of TamilNadu and NGO's has initiated several programmers to provide training in organic farming in Erode district have been selected for the present study as the concentration of organic growers is more in these district. Erode district were selected for primary data collection. These districts were purposefully selected because of the concentration of organic farmers in these districts. There are 30 organic farmers, located in Erode. The study covered all the 30 farmers practicing organic farming system.

## VII. STATISTICAL TOOLS USE

In order to determine the impact of farm specific variables on the technical efficiency scores generated by Frontier Production Function, multiple regression analysis was used.

The following regression model is specified.

$$TE = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + e$$

Where

$x_1$  The age of the head of the family

$x_2$  Education background (dummy), if graduate 1, otherwise 0

$x_3$  Training (dummy), if trained 1, otherwise 0

$x_4$  Experience in cultivation more than 5 years 1, otherwise 0

$b_1, b_2, b_3$  and  $b_4$  are respective regression coefficients.

## VIII. RESULT AND DISCUSSION

Transition is the process of conversion from conventional agriculture to organic agriculture. After the introduction of all necessary changes, it might take some time before the transition is completed. Conventional farming system depends on external inputs and is market oriented. On the other hand, organic farming is based on organic principles of nature and depends more on inputs produced on farm itself. The production under to organic agriculture need not necessarily for subsistence. The growers may have several objectives in shifting from conventional system of cultivation to organic system. Sample growers were asked about for how long they have been practicing organic farming. Experience of organic farmers is presented in Table 1.1. Perhaps this will give some direction of the transition process (Table 1.1).

The experience of the farmers is categorized into three group's viz., those below 2 years, 2 to 7 years and above 7 years. Majority of the farmers are practicing between 2 to 7 years. Out of the total 24 per cent have an experience of below 2 years and 46 per cent have been having between 2 and 7 years of experience. Another 30 per cent of the farmers have more than 7 years of experience in Erode district organic farmers.

## IX. REASONS FOR TRANSITION

Information on what made the selected farmers to switch over to organic

farming system from conventional farming system was gathered. In many cases majority of the farmers reported that transition from modern agriculture to ecological agriculture was due to the possibility of producing healthy food, environmental protection and soil fertility management. A detailed analysis of one perennial and two seasonal crops (maize and paddy) and five annual crops (sugarcane, turmeric, banana and tapioca) is presented in (Table 1.3).

Many reasons are expressed by coconut growers for transition from conventional agriculture to organic agriculture. According to 41.28 per cent of grower they have shifted as it protects environment table 7.8. In their opinion, by shifting it reduces soil erosion due to chemical use. It helps in maintaining soil fertility so that there can be sustainable yield in future. For these growers, sustainable of agriculture is important and they are aware that by switching over to ecological agriculture soil fertility can be retained. In recent years paddy farmers are practicing organic agriculture due to different reasons. According to selected farmers, more than 48.16 per cent of the total farmers have shifted from conventional agriculture to organic agriculture, in order to maintain soil fertility. Paddy farmers also said that organic agriculture produces more healthy food compared to conventional agriculture. Cost of cultivation is high in organic agriculture compared to conventional agriculture, because initially more investment is required in organic agriculture. In the case of maize, 27.2 per cent of grower they have shifted as it protects environment. In their opinion, by shifted it reduces soil erosion due to chemical uses. According to some growers, by using organic fertilizer the

balance in the soil health can be maintained. The other important factor is health consciousness.

According to sugarcane, 65.8 per cent of the total farmers have transformed from conventional agriculture to organic agriculture due to soil fertility maintenance and environmental factors like pollution control, sustainability and water management etc. sugarcane farmers also opined that organic agriculture creates more employment compared to modern agriculture. For banana, 37.84 per cent of the total farmers have shifted from agriculture to organic agriculture due to environmental factors like pollution control, sustainability, water management etc. Health 30.32 per cent and soil fertility 27.2 per cent are the other factors that have influenced the farmers to shift from conventional agriculture to organic agriculture. Regarding to turmeric, 41.28 per cent of the total farmers have shifted from conventional agriculture to organic agriculture because they believe that it leads to soil fertility increased. Turmeric farmers also opined that organic agriculture creates more employment compared to conventional agriculture. Only 20.64 per cent of the farmers shifted because they think that cost of cultivation is low under organic agriculture. According to tapioca 30.88 per cent of the total farmers have shifted from conventional agriculture to organic agriculture because they believe that it leads to cost of cultivation low. More than 24.08 per cent of the total farmers have transformed from conventional agriculture to organic agriculture due to soil fertility increased. Tapioca farmers also opined that organic created more employment compared to conventional agriculture.

## X. CONCLUSION

The farm system is a unique agroeco system a combination of physical and biological resources such as land forms, soil, water plants (wild plants, trees and crops) and animals (wild and domestic). By influencing the components of this agro eco-system and their interactions the farm household obtains output or products such as crops, wood and animals. To keep the production process going, the household needs inputs e.g. seeds energy, nutrients, water. Internal inputs are those harvested on the farm, rain water, sediments, nitrogen fixed from the air or produced on the farm e.g., animal traction, wood, manure, fodder, family labor and learning experiences. In this connection many reasons are expressed by coconut grower for transition from modern agriculture to ecological agriculture. In their opinion, by shifting it reduces soil erosion due to the use of chemical. It helps in maintaining soil fertility so that there can be sustainability yield in future. For these growers, sustainability of agriculture is important and they are aware that by switching over to ecological agriculture soil fertility can be retained. According to some of growers, by using organic fertilizer can be retained. According to some of the growers, by using fertilizer the balance in the soil health can be maintained. The other important factor is health consciousness. Cost of cultivation, employment and yield are the economic reasons for the transition given by the grower. The data also supported that argument that yield and employment generation are more in ecological agriculture compared to conventional agriculture. But contrary to the expectation



cost of cultivation is more in organic agriculture. Similarly Initiatives from the state, civil societies and scientists for promoting organic farming will improve this sector. Due to health, economic and environment reasons, people demand more of chemical for food items. This is

more evident from the data for global level. Middle income households in domestic market also look out for such products. Hence comprehensive and continuous efforts must be intimated on this right direction.

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## Appendix - 1

**TABLE - 1.1 CHARACTERISTICS OF FARMING SYSTEMS**

| <i>Farming System</i>       |                    |                     |                          |
|-----------------------------|--------------------|---------------------|--------------------------|
| <i>Features</i>             | <b>Traditional</b> | <b>Conventional</b> | <b>Organic</b>           |
| <b>Productivity</b>         | Low                | High                | High                     |
| <b>Sustainability</b>       | Moderate           | Low                 | High                     |
| <b>Farm complexity</b>      | Complex            | Simple              | Complex                  |
| <b>Environment</b>          | Diverse            | Uniform             | Diverse                  |
| <b>Diversity</b>            | Subsistence        | Market              | Subsistence/ market      |
| <b>Production</b>           | Local              | HYVs                | Improved local varieties |
| <b>Orientation</b>          | Low                | High                | Nil                      |
| <b>External Inputs</b>      | Low                | High                | Nil                      |
| <b>(Seeds)</b>              |                    |                     |                          |
| <b>Chemical Fertilizers</b> |                    |                     |                          |
| <b>Use of Biocides</b>      |                    |                     |                          |

*Source: Werf and Narayan, (1989).*

**TABLE - 1.2 EXPERIENCE OF ORGANIC FARMERS**

| SI.No    | No of Years  | No of Farmers   |
|----------|--------------|-----------------|
| <b>1</b> | <- 2 years   | <b>7 (24)</b>   |
| <b>2</b> | 2 to 7 years | <b>14 (46)</b>  |
| <b>3</b> | > -7 years   | <b>9 (30)</b>   |
|          | <b>Total</b> | <b>30 (100)</b> |

**Source: Primary Data**

**FLOW CHART – 1.1 CLASSIFICATION OF DIFFERENT TYPES OF FARMING REGARDING ENVIRONMENTAL COMPATIBILITY**

